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☐ Scallop FMP
☒ BSAI Crab FMP
☐ Salmon FMP

HABITAT AREAS OF PARTICULAR CONCERN (HAPC) PROPOSALS

Name of Proposer: Jim Ayers   Date: January 10, 2004

Address: 175 S. Franklin Street, Suite 418
                     Juneau, AK 99801
                     (907) 586-4050

Affiliation: Oceana

Title and Brief Statement of Proposal:

Aleutian Islands Special Management Area: Coral Gardens

The Aleutian Islands ecosystem is one of the most vibrant, dynamic, productive and rare ocean environments in the world. With over 450 species of fish, more than 50 species of seabirds that migrate from all seven continents around the world, and 25 species of marine mammals, this rich and unique sea world is an international treasure. It is a rare and wondrous place on the planet deserving of special protections. NOAA Fisheries submersible dives in 2002 and 2003 revealed exquisite cold water coral gardens with the greatest diversity and abundance of cold water corals in Alaska and perhaps the world (Stone 2003). As such, the Aleutian Islands should be managed as a special management area, and specific fishery mitigation measures are necessary to protect the rare and fragile benthic habitat on the Aleutian Islands seafloor. In an ecosystem as biodiverse, productive, and rare as the Aleutians Islands marine environment, destructive bottom trawling should be permitted as the exception, not the rule, and only in areas where it is scientifically proven to not harm the ancient living seafloor.

Objectives of Proposal:
(Identification of the habitat and FMP species the HAPC proposal is intended to protect.)

This proposal will protect the **coral gardens** HAPC of the **Aleutian Islands** from impacts from any commercial fishing gear that advertently or inadvertently touches the bottom.

Coral gardens are dense aggregations of corals, sponges, and other important living seafloor habitat that support a myriad of marine life.

Oceana's Aleutian Islands Coral Gardens HAPC proposal is completely contained within the designated essential fish habitat areas of the following FMP managed species: Shortraker rockfish, rougheye rockfish, northern rockfish, sharpchin rockfish, dusky rockfish, Atka mackerel, Pacific cod, Pacific ocean perch, and Golden king crab.

Statement of purpose and need:

The seafloor of the Aleutian Islands is unique. It is also an economic gold mine as part of Alaska fisheries that provide more than half of the nation's seafood. However, indiscriminate destructive bottom trawling in delicate living seafloor habitat like corals, sponges, and other living substrates is irreversibly marring this unique, pristine environment.

From 1990 to 2002, U.S. federal fishery observers reported over 1,500 metric tons of coral and sponge bycatch from the Aleutian Islands, of which approximately 90% was caused by bottom trawling (NMFS 2002). Corals and sponges have already been identified as HAPC by NOAA fisheries in Amendment 55 to the Groundfish FMPs (1998). As such, it is prudent and necessary to mitigate the impacts of this destructive bottom trawling on these known HAPCs.

Such mitigation is not unprecedented. Protection of deep sea corals and sponges was cited as a rationale for the Sitka Pinnacles Marine Reserve and the no-trawl zone in Southeast Alaska (Witherell and Coon 2000).

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Additionally, world fisheries have a documented geographic and depth expansion (Pauly et al., 2003). It is important to protect unexploited areas from future expansion to deeper, previously unfishable areas until there is better understanding of deepwater communities (Koslow et al., 2000).

A description of how the proposed HAPC addresses the four considerations set out in the final EFH regulations:

NOAA Fisheries has identified corals and sponges in Alaska as HAPC as indicated in Amendment 55 to the Groundfish FMPs (1998). Additionally, in a letter from Dr. William Hogarth to Mr. Jim Ayers dated September 9, 2002, Dr. Hogarth stated, "Corals, sponges, and other living substrate in waters off Alaska are already classified by NOAA Fisheries as Habitat Areas of Particular Concern deserving of special protection because of their importance as habitat and their vulnerability to human impacts."

1. Ecological importance: does the habitat perform an important ecological function?
Deep water corals and sponges provide high quality fish habitat. The vertical structure formed by these coral colonies provides relief on the seafloor, increases habitat complexity, increases niche breadth, and increases biodiversity. Sessile epifauna increase habitat complexity and play an important factor in structuring benthic communities (Bradshaw et al. 2003). The coral garden areas described below support a rich diversity of species in a small area and are worthy of special protection.

Corals, sponges, and other living seafloor are habitat that provides nurseries, places to feed, shelter from currents and predators, and spawning areas for many species of marine life including rockfish, Pacific Ocean perch, flatfish, Atka mackerel, golden king crab, shrimp, Pacific cod, pollock, greenling, greenland turbot, and sablefish. Perhaps the oldest animals on the planet, these long-lived corals have evolved in one of the most stable habitats on earth, too deep to be affected by tides and waves or sunlight. Consequently, they are extremely vulnerable to disturbance and are easily destroyed by a variety of fishing gears.

2. Sensitivity: the extent to which the habitat is sensitive to human induced environmental degradation
Areas characterized by low natural disturbance and long lived species are the most sensitive to anthropogenic disturbance (NRC, 2002). The seafloor of the Aleutians epitomizes the type of habitat that is most sensitive to disturbance and takes the longest to recover, if ever. Deep-water corals are the oldest and slowest growing types of epifauna. Gorgonian coral colonies are long-lived and slow-growing. A colony of *Primnoa resedaeformis* was aged to 112 years in the Gulf of Alaska (Andrews et al. 2002). Larger colonies formed from multiple settlement events may be 500 years old or more (Risk et al, 2000). Between 1990 and 2002, 175 metric tons of coral and bryozoans were removed by commercial bottom trawls at a depth of approximately -500 m (NORPAC data, unpublished). The depth distribution of corals species Paragorgia and Primnoa in the Aleutians falls within depths currently exploited by the trawl fleet.

3. Exposure: whether, and to what extent, development activities are, or will be stressing the habitat
From 1990 to 2002, U.S. federal fishery observers reported over 1,500 metric tons of coral and sponge bycatch from the Aleutian Islands, of which approximately 90% was caused by bottom trawling (NMFS 2002).

Bottom trawling alters the physical structure of the seafloor, reduces habitat complexity, and changes the composition of benthic communities. Bottom trawling removes epifauna, thereby reducing habitat complexity and species diversity of the benthic community (Collie et al. 2000, Kaiser et al. 2000). According to the National Academy of Sciences, if disturbance from trawling exceeds the resiliency threshold, then irrevocable long-term ecological effects will occur. Gravel pavement substrate disturbed by bottom trawling on Georges Bank in the Northeast Atlantic, for example, had significantly less emergent epifauna, shrimp, polychaetes, brittlestars, and small fish than undisturbed sites (Collie et al., 2000). Scavenging organisms tended to dominate communities in areas of high dredging disturbance while long-lived organisms and fragile taxa disappeared (Collie et al. 1997).

Bottom trawling decreases benthic productivity. Trawled areas of the North Sea, off the coast of Ireland, were significantly less productive when compared to untrawled areas of similar habitat type (Jennings et al. 2001). Areas disturbed by mobile fishing gear on Georges Bank had lower levels of benthic production (both biomass and energy) when compared to undisturbed areas (Hermsen et al. 2003).

Research conducted in Alaska confirms research in other regions indicating that bottom trawling gear damages sensitive benthos. When bottom trawling occurs in coral habitat, up to 30% of coral colonies can be removed (Krieger, 1999). During a submersible study in the Gulf of Alaska, it was reported that 50% of the coral had been removed or broken by a single pass of a research bottom trawl (Krieger, 2002). The corals at the site had not recovered seven years later (Krieger, 2002).

In Seguam Pass in the Aleutian Islands, gorgonian corals, which 20 years ago were a major component of the bycatch of the Atka mackerel fishery, steadily declined thereafter (NMFS 2001). This suggests that after years of bottom fishing, there were significantly fewer of these habitat-forming species left to catch. Video observation of some areas in Seguam Pass show completely destroyed coral habitats with only fragments of coral skeletons and rubble on the bottom (Zenger, 1999).

4. Rarity: the rarity of the habitat type

Aleutian Islands benthic habitat is unique and has been recorded nowhere else in Alaska or in the world. Hard corals in the genera *Paragorgia, Fanellia, Callogorgia*, *Primnoa*, *Calcigorgia*, *Thouarella*, and *Arthrogorgia* are present in dense aggregations. Such bioherms, described as deep-sea coral gardens, are unique to the Aleutian Islands.

Proposed management measures and their specific objectives, if appropriate:

Given its unique status on the planet, we propose the entire Aleutian Islands region be designated as a **Special Management Area** with categories of HAPC and respective management approaches. Management measures for coral gardens should prohibit all commercial bottom contact in the five known coral gardens described below. This protection should also be applied to any coral garden discovered in the future.

Consistent with the Council and agency's discussion, this HAPC proposal assumes that currently closed or restricted areas would remain closed or restricted. For example, current management measures to protect Steller sea lions and their habitat would remain in place.

Proposed solutions to achieve these objectives: (*how might the problem be solved?*) Include concepts of methods of measuring progress towards those objectives.

The pristine coral gardens of the Aleutians deserve special protection. We propose the five known and identified coral gardens be protected by prohibiting all commercial bottom contact within 3nm from the center point of each coral garden documented by submersible dive.

Expected benefits to the FMP species of the proposed HAPC, and supporting information/data:

Oceana's Aleutian Islands Coral Gardens HAPC proposal is completely contained within the designated essential fish habitat areas of the following FMP managed species: Shortraker rockfish, rougheye rockfish, northern rockfish, Atka mackerel, Pacific cod Pacific ocean perch, and Golden king crab.

The areas described in this proposal are ecologically important for many reasons, including as habitat for commercially exploited groundfish species. Corals provide essential habitat for a variety of marine species including several species of rockfish, king crab, Atka mackerel, shrimp, Pacific cod, walleye pollock, Greenland turbot, greenlings, and other flatfish (Krieger 1999). Rockfish and Atka mackerel are associated with gorgonian coral, hydrocoral and cup corals (Heifetz 2002). Soft corals in the Bering Sea were found to be in close association with gadids (e.g. Pacific Cod and Walleye Pollock), Greenland turbot, greenlings, and other flatfish (Heifetz 2002). Krieger (1993) noted that juvenile Pacific ocean perch exhibit a preference for rugged areas containing cobble-boulder and epifaunal cover and that shortraker rockfish strongly prefer rugged, high-profile habitat interspersed with boulders. Carlson and Straty (1981), Straty (1987), and Pearcy et al. (1989) found that juvenile rockfish exhibit a preference for high-relief habitat. Juvenile and adult *Sebastes sp.* were often found in association with *Primnoa spp.* during underwater video surveys of rockfish habitat in southeast Alaska (Bizzarro, 2002). Corals may be important for growth to maturity for demersal slope rockfish (EFH EIS).

Research from around the world indicates the destruction of living seafloor negatively impacts fish populations. Destruction of bryozoan growths by trawling in Tasman Bay, New Zealand resulted in a marked reduction in numbers of associated juvenile fish (Turner et al. 1999). Predation rate on juvenile Atlantic cod (*Gadus morhua*) increases with decreasing habitat complexity (Walters & Juanes 1993). Case studies in New Zealand and Australia suggested that loss of habitat structure through removal of large epibenthic organisms by fishing had negative effects on associated fish species (Turner et al. 1999). Removal of epifaunal organisms like corals may lead to the degradation of habitat such that it is no longer suitable for associated fish species (Auster et al. 1996).

Protecting habitat areas from fishing impacts has positive effects. In an area of the Irish Sea, for example, an 11 year closure to scallop dredging increased hydroid colonies (Bradshaw et al. 2003). Hydroid colonies increased diversity and abundance of benthic fauna as well as recruitment of juvenile scallops (Bradshaw et al. 2003). A model of trawl closures around locations where trawl "hangs" occurred showed that prohibiting trawling in areas with structural complexity had positive effects on juvenile Atlantic cod (Link & Demerest, 2003).

<u>Identification of the fisheries, sectors, stakeholders and communities to be affected by the establishment of the proposed HAPC (Who benefits from the proposal and who would it harm?) and any information you can provide on socioeconomic costs, including catch data from the proposed area over the last five years</u>:

The approximate area of a coral garden closure is 92 km^2. The total area of the five coral garden closures is approximately 380 km^2 due to considerable overlap of buffers of two of the gardens. These areas are outside of the core bottom trawling area. The coral garden areas cover a very small percentage of the fishing area available to the longline and golden king crab fleets. The economic impact of these small scale closures to the fishing industry is expected to be minimal. Further economic assessments may be conducted in the HAPC National Environmental Policy Act process.

<u>Clear geographic delineation for proposed HAPC (example written latitude and longitude reference points and/or delineation on an appropriately scaled NOAA chart)</u>:

A database of start and end points of submersible dive tracks in the Aleutians by NOAA scientists of Auke Bay Lab was used to identify the locations of Aleutian coral gardens. The dives listed in Table 1 showed complex coral communities or coral gardens (Stone, 2003). One of the gardens is located on a pinnacle formed by an undersea volcano off Semispochnoi Island. Point locations of the coral gardens were determined as the midpoint of the submersible dive track.

Table 1: Coral Gardens in the Aleutians

NOAA Dive #	Latitude	Longitude	Buffer
5594	51.9654	-176.8284	3 nm radius
5596	51.9100	-177.4095	3 nm radius
5605	51.8500	179.8304	3 nm radius
5607	51.3996	-179.0371	3 nm radius
6000	51.8441	179.8195	3 nm radius

Map

Coral Gardens Known in the Aleutians
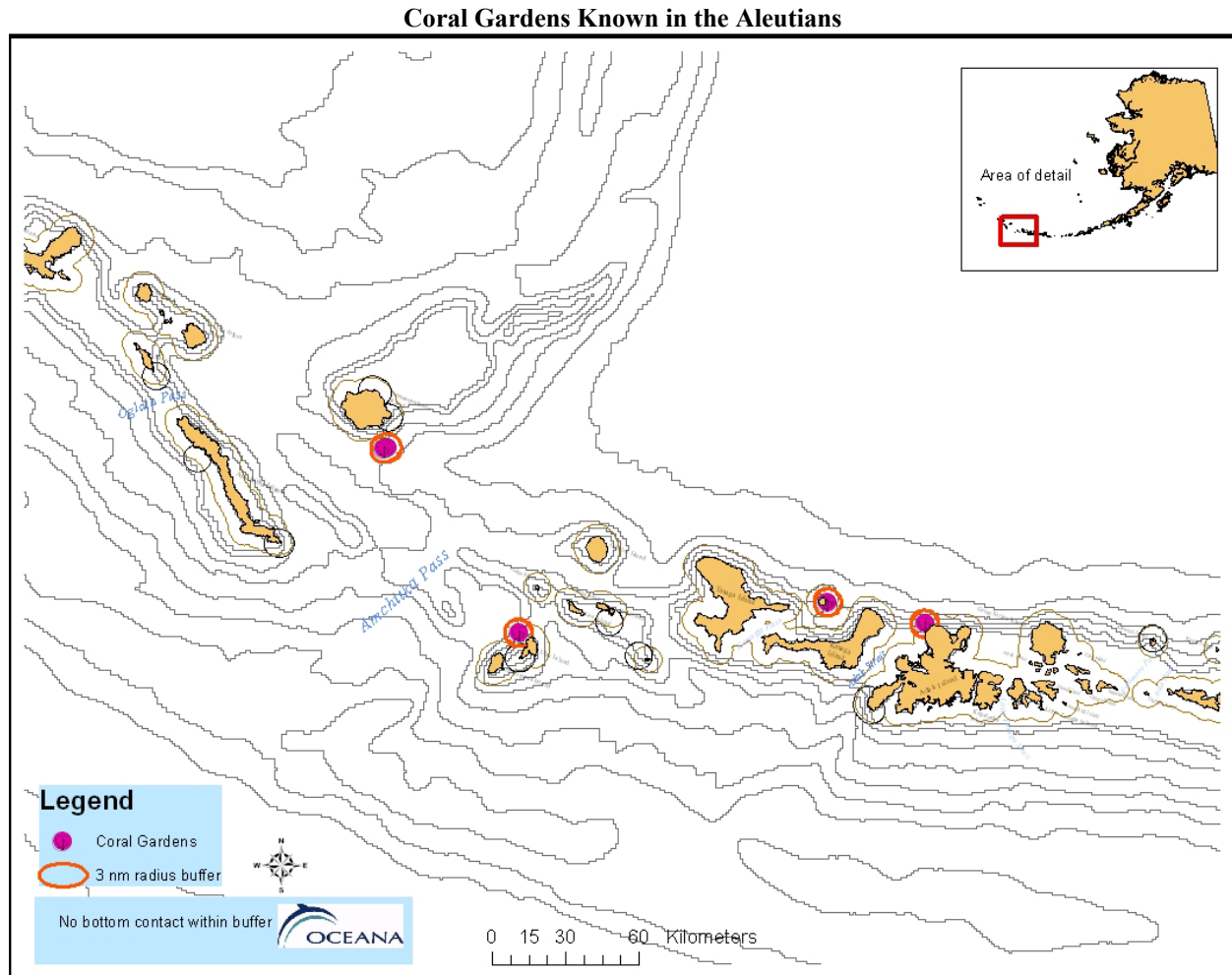
Map 1: Aleutian Islands, Attu Island to Great Sitkin Island: Coral gardens (Note: Two coral gardens overlap on the map)

<u>Provide best available information and sources of such information to support the objectives for the proposed HAPC. (Citations for common information or copies of uncommon information)</u>:

Data Acquisition and Assumptions:
The following section describes the information and process Oceana used to develop proposed HAPC designations and associated management measures.

The precision and accuracy of our analyses is necessarily limited by the precision and accuracy of the underlying information. Our requests to the Fisheries Service for observer data were provided in aggregated 10x10 km blocks. The blocks, or "grids" are referenced by a master gridcode. Blocks displayed in figures in this proposal can be referenced to latitude/longitude coordinates on navigational charts. We used these data to analyze fishing effort and the approximate economic value of fishing areas. Data at this resolution covered approximately 90% of groundfish fishery effort (Ren Narita, AFSC pers. comm.). A necessary assumption for the analysis was that fishing effort was uniform across a given block. For example, a closed area within a block would have an economic impact proportional to the percentage of the block that was closed. As such, an area of 25 km^2 closed to a certain gear type within a 100 km^2 fishing block where $1 million ex-vessel fish value was caught would result in an economic impact of $250,000 of lost revenue. Another assumption is that unobserved vessels fished in the same blocks as observed vessels.

In addition to using observer data, we also incorporated information from the NOAA RACEBASE trawl survey database. Trawl survey end points were plotted as point locations and the catch per unit effort for coral species or

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species groups was noted. Catch per unit effort in kilograms per square kilometer was calculated by dividing sample weight by area swept. Area swept was calculated as the net width multiplied by trawl distance.

The location of areas described from submersible dives as coral gardens (Stone, 2003) was obtained from NOAA scientists.

Methods:
Coral gardens were plotted on the map as point locations.

Relevant Literature:

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